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ABSTRACT

Most colleges and universities have Internet connections that provide students and faculty access to a world of information resources. The challenge for instructors and the administrators is integrating these resources into the curriculum. One of the most influential technologies is electronic mail, which helps foster communication between teachers and students. New information technology is also giving life to distance education, with interactive video being supplemented with bulletin boards, listservs, and Web pages. This sort of interaction has not yet advanced to the point where it can substitute for the traditional classroom experience, nor is it anticipated to do so. Whether the lecture is over a distance, or in a traditional classroom, difficult concepts can become clearer when visual examples are there for the student's edification. The changing nature of the Internet makes navigation a challenge. The UWired program at the University of Washington is an attempt to bring the tools and skills within the reach of the average student. The UWired model shows that a well-planned and officially sanctioned program can work in integrating technology into students' lives; what is even more important is giving faculty a firm footing in these new techniques. Technology assists active learning, but teaching methods and teacher roles need to change as well. Teaching on the World Wide Web will mean changing content and appearance on a regular basis to fit student expectations of Web content; it will also mean an increasing need for the instructor to learn and adapt. (AEF)

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Integrating Courses with The Internet Preparing the Teacher as well as the Learner

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Introduction

Most colleges and universities have Internet connections that provide students and faculty with access to the world, giving them electronic mail, gopher and World Wide Web resources, newsgroups, chat services, and the ability to download software, text and graphic information. The challenge for the instructor and the computer administrator is integrating these resources into the curriculum. This presentation will present integration methods that have worked and help the administrator make this job easier for the instructor.

I teach speech and theatre at a small New England university. Technology has been emphasized there since the early eighties, when a series of grants helped create student computer labs and put computers in faculty offices. We now have about forty lab computers available for student use, with a computer for every faculty member. The machines are networked, and this summer will see an infusion of Pentium and Power Macs connected by Novell. Every student and faculty member has an e-mail address, and we all have access to the Internet via Gopher, Lynx, or Netscape. We have three classrooms that are linked to the Educational Network of Maine, which furnishes interactive distance learning to the state. One of those rooms has the facilities to originate ITV classes.

In short, we have been in a position to use technology for about ten years. Some instructors have embraced these new teaching tools, and some have tolerated computers in their offices. Some students love the chance to do their research over the Internet, and some moan audibly when an assignment involves a computer. Bringing technology into the classroom has been challenging yet rewarding. It is a process involving a great deal of hard work and frustration, but ultimately, it can augment the quality of the classroom experience.

Slipping into the Shallows

Steve Gilbert, of the American Association of Higher Education, differentiates technology use in several ways, one of which is whether it is "shallow" or "deep." An example of shallow usage would be using computer projection in a standard lecture in place of overheads, whereas deep usage would be a total re-thinking of the teaching/learning process utilizing technological assets. Both are valuable, and the instructor who wants to dive into deep usage often finds some shallow experience

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is an asset to course development.[3]

Since technology went from a dream to a promise, the prospect of revolutionary change has been on the horizon. It has largely stayed on the horizon, with the revolution giving way to a more gradual evolutionary change. One significant change is the passing of educational technology from early pioneers to the mainstream. E-mail and the Web are bringing technology into the classroom. These incursions are less than dramatic, as many instructors first use technology in much the same way they would use older resources. These might include, as mentioned above, using computer graphics in a standard lecture, incorporating e-mail to enhance teacher-student communications, or teaching a course over interactive television. Although these early techniques might strike one as incremental, they lead to improvements in teaching and learning.[4]

One of the most influential technologies was electronic mail. Faculty have used it to allow students to ask more questions, overcome shyness, and generally increase participation. Although some faculty notice an increase in workload, the change brings with it increased interaction (better both in quantity and quality) with students.[5] I have been using e-mail for several years in my courses in public speaking, communications, and dramatic art. Students in these classes are required to use e-mail at least once in the semester, and they are encouraged to hand in assignments electronically. The time between assignment and correction is radically shorter than it is with paper and ink, and my students make additional efforts to redo and re-submit work, knowing that they will receive corrections within a day or so, but more often within the hour. E-mail also helps foster interaction, as students frequently are freer with comments than they would be in person.

This past year I have encouraged my students to do more of their research over the Internet. Our library is small, and frequently students find that it does not have the resources they need. Since my public speaking class involves a research component, my students this year had to go on a "Treasure Hunt," which involved finding information using Lynx and Netscape. A combination of lecture, demonstration, and peer instruction helped introduce them to the Internet. Although there were still groans, many discovered an exciting research tool that they continue to use to augment their presentations.[6]

Going the Distance

The new technology is also giving new life to distance education, with interactive video being supplemented with bulletin boards, listservs, and web pages. This sort of interaction has not yet advanced to the point where it can substitute for the traditional classroom experience, nor is it

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[3]Steve Gilbert, "Making the Most of a Slow Revolution," *Change*, 28, no. 2 (March/April 1996), pp. 10-12.

[4]Gilbert, p. 10.

[5]Gilbert, p. 12.

[6]http://130.111.175.15/Home/Techno-Teaching/WebHunt.html

anticipated to do so. However, the classroom continues to lumber toward change. "Virtual Universities" are being proposed and followed through. Technology is also used to push productivity gains, forcing universities to serve a larger and more varied population with fewer resources. Technology is thus dual-edged, creating more options while facilitating (in the legislative mind, at least) the reduction of the faculty workforce.[7]

The Western Cooperative for Educational Telecommunications has developed a set of "Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs." Dealing primarily with distance education programs, these principles are designed to ensure quality education over electronic channels. They state that programs should be rigorous and complete, allowing meaningful interaction with qualified faculty. The program should follow the mission of the transmitting institution. The faculty teaching in such programs will be trained and supported, and appropriate resources will be available to all students. The demands of the program on the student will be clearly stated and available to all students. Finally, the program shall be evaluated on a regular basis to ensure quality[8].

In teaching Public Speaking over interactive television, I found the computer in general and Microsoft Powerpoint in particular to be a godsend. The sizable amount of lecture material needed for this course would have been confusing at best and unintelligible at least had it been delivered using a blackboard. Powerpoint made computer-generated slides, primarily text, with an occasional graphic, easy to produce. When transmitted and matted with my live image, the lecture improved considerably in reaching the class members. The precision of the computer imagery adds a lot to the effectiveness of the presentation.

Seeing the Big Picture

Whether the lecture is over a distance or in a traditional classroom, difficult concepts can become clearer when visual examples are there for the student's edification. For example, when Watson and Crick were developing their model of the DNA molecule, a tabletop model helped them to see the peculiar geometry of the double helix.

Computer software has advanced to the point that visual presentations that were once the province of either artists or complex programmers are now easily available. For example, in science and engineering, tools such as Mathematica or Silicon Graphics' FAST give equations a form, a shape that the student can instantly perceive. The Internet is an excellent source of visual data, as the net-savvy student or instructor can download any graphic from anywhere in the world.

Of course, the graphic is only as good as its user, and accurate and meaningful representation works best when collaboration across disciplines leads to interaction between engineers and artists. It is often advantageous to involve the student in the process as well. Thus in a lab situation, the pairing

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[7]Gilbert, pp. 12-13.

[8]Sally M. Johnstrone and Barbara Krauth, "The Virtual University: Principles of Good Practice." *Change*, 28, no. 2 (March/April 1996), 38-41.

of the scientist and the artist can lead to a symbiotic relationship, which, under the proper guidance, can lead to results far beyond what either could have achieved alone.[9]

Learning to Surf

Outside the classroom, students and faculty both need to engage in meaningful research. This has traditionally taken place in the campus libraries and laboratories. The advent of the Internet has removed physical location as a consideration. From computer labs to offices to dorm rooms, students and faculty are surfing the net in pursuit of knowledge. Unfortunately, the Web is inherently anarchic, and finding meaningful information can be challenging. A well though-out program of instruction can ease the transition to technology-based learning.

The changing nature of the Internet makes navigation a challenge. The UWired program at the University of Washington is an attempt to bring navigation tools and skills within reach of the average student. It targeted three groups of incoming freshmen for intensive technology instruction. With corporate support from Apple and Microsoft, the project began in the summer of 1994.

Faculty and staff for the project took five days for intensive training in information access, integrating Internet resources into both upper and lower division courses, using e-mail for class instruction, use of the UW library resources, and using commercial software in classes.

The student training emphasized collaborative learning with study groups and co-authored assignments. Students took a two credit seminar in Information and Technology, which was taught by librarians. The seminar emphasized cross-curricular skills which could translate across disciplines and skill levels. Seminars were taught in a special classroom with Ethernet and power connections.

The program received high ratings. Not only were students willing to take similar courses, but instructors noted significant differences in their abilities to access information and their engagement in the learning process. General scores were higher, as were library abilities. Other factors that enhanced the program were the emphasis on collaboration and the portability of the Powerbooks.[10]

The UWired model shows that a well-planned and officially sanctioned program can work in integrating technology into students' lives. What is even more important is to give faculty a firm footing in these new techniques. For a variety of reasons, academe changes more slowly than industry. Time demands, resource limitations, and a reluctance to abandon tried-and-true techniques stretches transition time. Faculty need to see a clear benefit to change their teaching styles and methods. Last year, our computer manager held a workshop to introduce faculty to Internet resources. They had fun sending e-mail, finding recipes on the Gopher, and browsing the various groups. Unfortunately, the trivial nature of *alt.alien.vampire.flonk.flonk.flonk* and other groups led

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[9]Steven Aukstakalnis and Wm. Michael Mott, "Transforming Teaching and Learning through Visualization." *Syllabus*, 9, no. 6 (March 1996), 14-16.

[10]Louis Fox, and Kathryn Sharpe, "UWired: Drivers' Ed for the Information Highway," *Educators' Technology Exchange* 3, no. 2 (Fall 1995), 18-24.

most of them to conclude that this was a cute toy that would never replace a couple of hours in a good old-fashioned musty library.

Jumping into the Deep End

Education is changing to make learning more active, less authority-driven. Technology assists active learning, but teaching method need to change. For example, lecturing may prove less effective than facilitation exercises. Where once a faculty member was the gatekeeper to knowledge, now Information Age technology gives every student access to vast oceans of information. Both students and faculty must become masters of "Information literacy." As defined by C. S. Doyle, one who is information-literate can "identify a problem, recognize the need for accurate and complete information to make decisions, ask questions based on information needs, develop search strategies, access and evaluate information, organize and integrate information, and use it in critical thinking and problem solving." The change involves the sheer amount of data which is out there and easily available. For many faculty, keeping up with the technology that opens these floodgates is a major effort. Add to that anxiety about the entire process and many faculty will find themselves deciding that changing their curriculum just isn't worth the time.[11]

What are the issues that keep faculty from adapting? Fear of change, fear of the time involved, fear of appearing incompetent, fear of technobabble, fear of failure, not knowing where to start, fear of making a bad choice, fear of typing, and fear of rejection or reprisal are only the short list of reasons for holding back. How can we shift perspectives?

First of all, faculty must be realistic: Technology is not going away, and no *sabot* will stop its advance. Learning this will involve time and effort, but the longer one waits the harder the change will be. Secondly, faculty must decide who's boss: deciding what they want to accomplish in terms of their teaching and course objectives, then trying to fit the technology in place. Faculty must avoid trying to fit things in because they are available. If they ease into it, they can build on experience. It will help them to become familiar with the culture: there are catalogs, conferences, workshops and local training. These facilities are available. Faculty should use them.[12]

The individual faculty member can do a great deal by using his or her own resources. Play is often dismissed as intrinsically unworthy, but it is a wonderful learning tool. Faculty can practice and experiment on personal terms, on their own time. It also helps to draw on peers. On most campuses, there have been faculty members who have leaped into technology, learning it on their own and bringing it into their classrooms. If the techno-neophyte is able to network, he or she will find that there will be others who know how this stuff works. My advice is this: Let your hand be held. Ask questions. Arrange times to work with the others. Share disasters and conundrums as well as triumphs. Of course, those who are familiar with the technology must be willing to help. Finally,

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[11]LeAnne H. Rutherford and Sheryl J. Grana, "Retrofitting Academe: Adapting Faculty Attitudes and Practices to Technology," *Technological Horizons in Education Journal*, 23, no. 2 (September 1995), 82-83.

[12]Rutherford and Grana, p. 83.

acknowledge that one of best resources for use of technology is already in the classroom: your students. Reverse roles: don't be afraid to learn from your students. Experiment by letting them suggest ways to incorporate technology into your class.[13]

One of the major shifts in the teaching and learning process has been a decentralization in the classroom, with instructors shifting from presenters of information to facilitators. Technology is not vital to make this changeover, but it helps. For example, a faculty member may roam the computer lab assisting students as needed, but seldom does any lecturing. Unfortunately, the change may be coming at a rate that is far faster than we anticipate. Many students come into the classroom knowing how to surf the net, plucking content off computers far easier than the instructors. The lack of organization and quality control, in short, the basic anarchy of the Internet makes its integration into the classroom difficult.[14]

Caught in the Web

The Internet is developing its own culture. As ARPANET, it originated as a tool for a relatively small and elite group of educators, scientists, and professionals. It has since exploded in all directions, bringing people who are comfortable with technology and their computers, but are new on line and those who are complete novices to the computer experience. Newsgroups which may have proceeded at a stately 30 to 40 postings per day are now flooded with ten times the amount of participants. This flooding has led to domain snobbery: long time users look down their noses at correspondents from "aol.com."[15]

This explosion has also found its way onto the World Wide Web. There is a great deal of content but no assurances of quality or relevance. Many pages are from corporations trying to sell us products with fancy graphics and skimpy content, some are simply "shovelware" with lots of content but no consideration for the design and usage demands of the Web medium.

The faculty member who wants to utilize the Web soon finds out that it is a demanding job on many levels. Working with HTML is programming, and it is as unforgiving as any other computer language. The process can be lengthy and painstaking. Programs such as PageMill offer alternatives to hand-coding, but many features still have to be entered line by line. Secondly, a good web page uses graphics effectively. One can no longer just consider the verbal explanation of concepts but their visualization as well. Audio, video, forms, clickmaps, and CGI functions make alliances with a dedicated programmer not just desirous but a necessity.[16]

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[13]Rutherford and Grana, pp. 83-86

[14]Trent Batson and Randy Bass, "Teaching Learning in the Computer Age," *Change*, 28, no. 2 (March/April 1996), 42-44.

[15]Danny Goodman, "Education and the Internet: The Coming Challenge to Internet Culture," *Syllabus* 9, no. 3 (November/December 1995), 10.

[16]Goodman, 11.

I have found web pages for individual classes to be extremely helpful. This past semester, my *Studies in Drama* course examined the metamorphoses works undergo as they change from medium to medium. For example, *Phantom of the Opera* began as a newspaper serial, was adopted as a classic silent film, and is currently on Broadway as a blockbuster musical. The resources for this course are centered on the class web page. The page contains links to articles, graphics, and fiction. The changeable quality of the web also allows for quick changes in the class. Some of the assignments were determined by the class, so when they decided to examine the Who's *Tommy*, the page was able to link to the many pages celebrating this work.[17]

The technology will continue to change, and interactivity will continue to increase, as will customization. For example, browsers may be customized to meet a class's needs. Teaching on the web will mean changing content and appearance on a regular basis to fit student expectations of Web content. It will also mean an increasing need for the instructor to learn and adapt.

Web pages and discussion groups change on a regular basis. This plasticity of resource leads to a different consideration of resource material. Books have a finished quality, a permanence that engenders (rightly or wrongly) a sense of trust. Electronic resources, by being in a constant state of flux, make creation clearer as a process. [18] I find this sort of change exciting. It allows for a change in traditional pedagogy and encourages a re-examination of the teaching process. One of the major benefits I received from teaching over the distance education system was that it forced me to take a good look at what I do in the classroom. Techniques that work fine face-to-face aren't always effective over the airways. On the other hand, techniques developed to engage the distance-education student often improve the interaction in the traditional classroom.

Conclusion

Technology promises to add to the process of teaching and learning. As faculty, we must be able to make the best use of computers, the Internet, and all of these resources. There is nothing wrong with starting out slowly: computer presentations, e-mail, and simple web pages can help you get your feet wet. However, if you get more involved in the process, then you need to re-examine the needs of your students and the objectives of the course. How can student web pages, collaborative work groups, class bulletin boards and chat areas improve the learning that takes place under your direction? Can collaboration advance beyond your class to include all interested students at your university? The Internet allows such discussion to take place with a world-wide audience. Explore the possibilities and do your best to make them realities. By asking these questions, the faculty member can take sure steps into the information age.

Of course, we aren't all new to technology. For the information systems manager, the challenge is making meaningful workshops available at times faculty can use them. It means making the resources available. It means making some sort of help, whether it is faculty peer help, staff assistance, on-line help, or student help desks available to faculty and staff. Some faculty will develop their skills writing HTML, some will do fine with applications such as PageMill, and others

[17]http://130.111.175.15/Home/Page2Stage/215.html

[18]Batson and Bass, pp. 44-45.

will need to have their pages made for them. The assistance can't just be technical: many faculty may need help with constructing effective teaching strategies that use technologies. The educational ideal of carefully considering our methods and their efects in the classromm may become more vital then ever when we condier the vast array of possibilities open to us and our students.

Change is constant and technology is integral to it. Some of us have rushed toward it. Many others are waiting to see results. Other still are resisting change as firmly as possible. Easing into the 21st century will involve a program of instruction, individual innovation, and a total effort that crosses disciplines and job descriptions.

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